

## ABSTRACT OF THE DISCLOSURE

A method to form a closed air gap interconnect structure is described. A starting structure made of regions of a permanent support dielectric under the interconnect lines and surrounding interconnect vias with one or more sacrificial dielectrics present in the remaining portions of the interconnect structure, is capped with a dielectric barrier which is perforated using a stencil with a regular array of holes. The sacrificial dielectrics are then extracted through the holes in the dielectric barrier layer such that the interconnect lines are substantially surrounded by air except for the regions of the support dielectric under the lines. The holes in the cap layer are closed off by depositing a second barrier dielectric so that a closed air gap is formed. Several embodiments of this method and the resulting structures are described.